Environment, Health and Safety Division

Integrated Functional Appraisal of the Engineering Division

FY 2001

Final Report
September 18, 2001

Executive Summary

The Environment, Health and Safety (EH&S) Division conducted the Engineering Division Integrated Functional Appraisal (IFA) during August and September 2001. The purpose of the appraisal was to identify uncontrolled hazards and to recommend control measures. The appraisal consisted of initial scope discussions, records review and inspection of spaces to identify uncontrolled hazards.. The inspection team consisted of specialists from EH&S, the Engineering Division Safety Coordinator and the designated Department of Energy Berkeley Site Office observer.

The IFA validated that EH&S hazards are effectively identified and controlled within the Engineering Division. Safety within Engineering Division has commendable management support. Overall, the Engineering Division has a good safety program, knowledgeable employees and commitment for improvement. Noteworthy practices and improvement opportunities are listed below.

Noteworthy Practices:

- All formal work authorizations (six Activity Hazard Documents and seven Sealed Sources Authorizations) are collaboratively and thoroughly reviewed by line management, Division Safety Coordinator and EH&S Division.

- Random interviews with Division employees during the IFA process demonstrated knowledge of operations and related EH&S issues.

Improvement Opportunities:

- Housekeeping, labeling of refrigerators located in shop or research labs, maintaining access to electrical panels, and chemical storage management in some areas need line management attention.

- Several compressed gas cylinders did not have required pressure relief devices installed on them.

- Machine guarding in Building 77 sheet metal shop needs improvement.

- A few computer workstations are not ergonomically compatible. It is recommended that a request for a workstation evaluation be conducted for those who use computers more than four hours a day.

- Seismic safety tie-down for office equipment needs improvement.

1.0 Introduction

The Integrated Functional Appraisal (IFA) is a key component of the Laboratory's Integrated Safety Management (ISM) program. It serves as one of the three tiers of the Laboratory's Self-assessment Program. The EH&S Division has been conducting IFAs of all laboratory organizations on a triennial basis since 1996. The last Engineering Division IFA was conducted in 1998.

2.0 IFA Process

2.1 Scope Development

The IFA team leader held an IFA kick-off meeting on August 13, 2001. The purpose of the kick-off meeting was to brief the IFA participants: EH&S subjected matter experts, the Engineering Division Safety Coordinator and DOE observer as to the purpose, conduct, expectation and to develop scope of work, and schedule.

The scope of the IFA was focused on work conducted under or in association with Formal Work Authorizations and other areas as deemed appropriate by the IFA team.

2.2 Appraisal Team

The appraisal team members, and their respective areas of subject matter expertise are listed below.

Kam Tung (EH&S) – IFA team leader, accident prevention and ergonomics

Matt Kotowski (EH&S) – General safety, accident prevention and ergonomics

Rob Connelly (EH&S) – Industrial Hygiene

Ken Brat (EH&S) – Laser safety

James Case (EH&S) – Radiation safety

Tom Caronna (EH&S) – Electrical safety

Connie Grondona (EH&S) – Health services

Weyland Wong (Engineering) – Division Safety Coordinator

Kathy Johnescu (DOE Berkeley Site Office) – Observer

Team members were selected on the basis of their technical expertise and familiarity with the areas and the hazards being evaluated. DOE was invited to participate as an observer and to promote Operational Awareness.

Members of the Engineering Division staff participated in the Appraisal included Rudy Barolo, Al Harcourt, Pat Gammon, Paul Luke, Mark Amman, Paul Knapp, Doyle Buford, Mike Press and Steve Chow.

2.3 Site visits

The inspection team visited the sites associated with Formal Work Authorizations. These areas were:

Building/Room	Formal Work Authorization
25-140	Electronics Photo Fabrication Shop (Chemicals)- AHD
77-156, 77H, FTU006	Ultra-High Vacuum Cleaning Facility (Chemicals)- AHD
70A-3345	GSI Plasma Enhanced Chemical Vapor Deposition Process Tool- AHD
84-122	Laser Fluorescence Experiments (Lasers)- AHD
77-108	Sheet Metal Shop Laser Cutting Machine (Laser)- AHD
70A-2263	Ultra-high sensitive mass spectrometry (Lasers)- AHD
70A-3347	Sealed Source Authorizations (SSA)
70A-3358	Sealed Source Authorizations (SSA)
62-312	Sealed Source Authorizations (SSA)
50B-6208	Sealed Source Authorizations (SSA)
25-108	Sealed Source Authorizations (SSA)
25-225	Sealed Source Authorizations (SSA)
25A-119	Sealed Source Authorizations (SSA)

The site visit consisted of performing a physical inspection of each area and interviewing individuals responsible for each area's operations and recording observed findings as well as their corresponding corrective actions. The team leader of the appraisal maintained a master list of the findings as the site visits progressed.

3.0 Results and Recommendations

Findings and corrective actions resulting from the site visits are summarized in Appendix 1. Overall, spaces were well maintained, indicating the commitment of management and staff to safety, as well as the effectiveness of the Division's self-assessment.

A summary of the more prevalent hazards are presented below:

Housekeeping: A few deficiencies that were noted in various shop and labs ranged from housekeeping (B77-108: sheet meta scrap not being pick-up and aisles obstructed) unlabeled refrigerators, blockage to electrical panels, and chemical management. Line management attention is needed. One significant concern involves B25 Room101's chemical storage. It is recommended that the current space owner work with the Division Safety Coordinator and EH&S to clean the orphan chemicals left by the previous space owner and to identify and dispose of unneeded materials. (Note: Engineering Division has an initiative underway aimed at correcting B25-101 chemical storage deficiency.

Pressure Safety: There were a number of compressed gas cylinders that did not have the required pressure relief devices. Each compressed gas system requires a pressure relief device set at no more than the maximum allowable working pressure (MAWP) to protect against system failure due to regulator failure or operator error. Appropriate measures should be taken throughout the division to correct this problem. More information on pressure system requirements and pressure relief devices can be found in PUB-3000 chapter 7, Pressure Safety and Cryogenics, available on-line at http://www.lbl.gov/ehs/pub3000 or by contacting John Seaburry (x6547), the subject matter expert.

Machine Guarding: Regular maintenance testing of light curtains (machine guarding) installed on the CINCINATI and WYSONG power press brake machinery in B77-108 has not been performed. It is recommended that the Engineering Division Machine Maintenance Group test and record light curtain per the manufacturer's operating manual. Also, it is suggested that the Laser Cutter in the same area should have a perimeter guarding to protect personnel against the moving material when it is in operation.

Workstation Ergonomics: Within the lab spaces that the IFA team visited, there were several computer workstations found to be not ergonomically configured. These conditions could increase the likelihood of repetitive motion injuries for the users. It is recommended that an ergonomics evaluation to be conducted for individuals who use these computers in excess of 4 hours per day.

Seismic Safety: A few filing cabinets and a small cryogenic dewar were not seismically secured and need to be.

4.0 Conclusion

Overall, the Engineering Division has established and implemented a functional safety management program for its Formal Work Authorization. People who have been interviewed were knowledgeable of operations and EH&S issues. All formal Work Authorizations have been thoroughly reviewed and approved. However, continuous

improvement opportunities still exist in the areas of injury/illness accident prevention, seismic safety (involving research and office equipment), machine guarding, housekeeping, pressure safety and ergonomics.

Appendix 1

Findings: Engineering Division

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Building	Room	Finding	Action
77	108	Sheet metal scrap left on floor around Shears: SH1 and SH2 creating potential trip and fall hazard	Pickup and dispose of sheet metal scrap on regular basis. As a minimum, at the end of each work shift
		Lack of machine guarding on Shear (SH1) causing rotating shafts to be exposed	Request Engineering Division Machine Maintenance Group install a rubber boots to cover the universal joints and recess exposed set screw on coupling
		Big Power Brake (CINCINATI): The non-functioning end of the interlock safety chain was not permanently anchored to the machine	Request Engineering Division Machine Maintenance Group permanently secured safety chain
		Big Power Brake (CINCINATI): Light curtain testing and calibration have not been performing as specified by the manufacturer.	Request Engineering Division Machine Maintenance Group test light curtains according to manufacturer's operating manual and log this activity
		Small Power Brake (WYSONG): Light curtain testing and calibration have not been perform as specified by the manufacturer	Request Engineering Division Machine Maintenance Group test and document light curtains according to manufacturer's operating manual
		Sheet metal lathes (SL-1 and SL-2): Local exhaust ventilation has a deficiency tags dated 7/7/95 and 6/24/99.	Request John Seabury of EH&S Division to review the ventilation system and define the deficiency and corrective action(s)
		Laser cutter does not have perimeter guarding to protect personnel against the moving material when it is in operation.	Request Engineering Division Machine Maintenance Group investigate and research means to prevent potential contact between the operator and moving material
		Inspection of all machinery in the shops has not been consistently conducted	Request EH&S Division Safety Engineering Group conduct a comprehensive inspection of all machinery in the Engineering Division shops
	156	Deteriorated floor matt under an operator's chair was found. It is a potential tripping hazard.	Replace the deteriorated floor matt
		Some of the overhead bridge cranes are not seismically braced.	Work with Facilities to identify a list of overhead cranes that are not seismically secured and develop a corrective action(s).

	FTU 006	Emergency shower is not in alignment with eyewash	Request Facilities Plumbing Group realign emergency shower with the eyewash
77 H		Potential for eyewash water to enter electrical equipment	Install a barrier to keep water from an activated eyewash from entering electrical equipment
25	101	Previous room occupant abandoned chemicals in chemical flammable storage cabinet and cabinet below the sink	. Request Mark Lasatemay of EH&S Waste Management Group to assist current occupant to identify and dispose of unwanted/orphaned chemicals
		The existing chemical flammable storage cabinets are not vented	Recommend investigating the possibility of venting the existing flammable storage cabinets to the overhead exhaust duct.
		Current Satellite Accumulation Area's (SAA) point of contact sign is not up-to-date	Update the SAA sign
		A waste container dated 10/25/00 has exceeded its storage time frame	Send a request to Waste Management Group to pick-up and dispose of the waste.
	101	Access to electrical Panel is blocked	Maintain clear access to electrical panel
		Overhead storage beside outside door is not seismically secured	Remove overhead storage.
		HF burn kit outdated	Obtain updated calcium gluconate burn kit fro Health Services and discard of old HF burn kit
		Equipment on top of glove box not seismically secured.	Relocate equipment or provide proper restraints
	225	Tall white laminar flow booth not seismically secured	Install proper seismic bracing
		Small glass containers are stored on lower slot of local exhaust ventilation. This may restrict exhaust air flow	Remove all containers.
	140	A few locations have raised flooring which may create tripping hazards	Install yellow caution tape or paint.
	174A	Toaster oven accumulation of residue grease is a potential fire hazard	Clean the toaster oven or replace it
25 A	119	Cabinets are not tied down due to seismic upgrade is in progress	Insure egress is maintain and anchor all cabinets once the seismic upgrade is completed

	101	Large plant on top of parts cabinet could fall and block egress in the event of an earthquake	Relocate the plant to a floor level location
		Newly installed cabinets are not seismically secured	Install proper restraints
70A	2263	Clean bench was not seismically secured	Install proper restraints
		Laser table was not seismically secured	Install proper restraints
		Compressed gas cylinders do not have a pressure relief device	Determine the Maximum Allowable Working Pressures and install a pressure relief device near the regulator
		Refrigerator needs "No Food Storage" label	Place "No Food Storage" label on refrigerator
		Ergonomic set-up for computer workstations needs further review	Contact EH&S liaison (x4048) for an ergonomic evaluation
	3345	A small Silane gas cylinder is placed on the floor next to the experimental equipment	Request IH to determine whether this cylinder should be stored in gas cabinet
		One side of the experimental equipment is not enclosed.	Install the side enclosure
		Compressed gas cylinders did not have pressure relief device	Determine the Maximum Allowable Working Pressures and install a pressure relief devise near the regulator
	3347	Noteworthy practices observed: Good use of "radiological work in progress" posting and outstanding housekeeping	Keep up the good work
		A small refrigerator needs "No Food Storage" label	Apply "No Food Storage" label" on refrigerator
		Hazards associated with Lithium Evaporator operation needs further review	Conduct a hazard review according to PUB 3000, Charter 6
		Deteriorated encapsulation of lead bricks was noted	Dispose or encapsulate lead bricks
		Compressed gas cylinders do not have a pressure relief device	Determine the Maximum Allowable Working Pressures and install a pressure relief device near the regulator
		Hazards with and controls for the Phosphorus Oxychoride experimental equipment needs further review	Conduct a hazard review according to PUB 3000, Charter 6

		A small auto-filling cryogenic dewar found on a bench top is not seismically secured	Install seismic restraints
	3358	Ergonomic set-up for computer workstations needs further review	Contact EH&S liaison (x4048) for an ergonomic evaluation
		All lights are turned off during certain experimental work.	Evaluate and determine the adequacy of emergency evacuation with lights off condition
62	312	Access to an electrical panel is blocked	Maintain clear access to an electrical panel
		Gas cylinder is secured with a single chain	Install a second chain; doubled chains are required for seismic safety
		Securing of overhead storage on two work benches is inadequate	Remove the overhead storage or properly restrain.